ABSTRACT
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that investigated the impact of the provision of Web-based teaching resources
within the Faculty of Information Technology of Monash University
(Australia). It presents staff perceptions of the time and effort required in
development and maintenance of Web-based teaching resources and any perceived
advantages. The study found that the production and maintenance of Web
resources, with the necessary acquisition of the required skills, has
significantly impacted staff workloads. Many staff were spending considerable
time on the development and maintenance of Web resources for their students,
often providing these in addition to the traditional paper resources. Some
staff were enthusiastic about the use of the Web in their teaching; however,
most described benefits in terms of subject management rather than from a
pedagogical perspective. (Contains 16 references.) (Author/AEF)

Time Versus Utility: What IT Staff Say About the Educational Use of the Web

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Abstract: This paper reports on a quantitative and qualitative study that investigated the impact of the provision of Web-based teaching resources within the Faculty of Information Technology of Monash University. It presents staff perceptions of the time and effort required in development and maintenance of Web-based teaching resources and any perceived advantages. The study found that the production and maintenance of Web resources, with the necessary acquisition of the required skills, has significantly impacted on staff workloads. Many staff were spending considerable time on the development and maintenance of Web resources for their students, often providing these in addition to the traditional paper resources. Some staff were enthusiastic about the use of the Web in their teaching, however most described benefits in terms of subject management rather than from a pedagogical perspective.

Keywords

World Wide Web, teaching resources, teaching and learning environments, tertiary teaching

Introduction

In the last decade the tertiary teaching scene has changed dramatically. Economic pressures have forced universities to look beyond their traditional markets. This has led to the expansion of the universities globally and the emergence of multiple campuses, necessitating different methods of course delivery. University lecturers have had to adapt their courses to teach in a variety of modes such as distance education and video conferencing, in addition to the traditional face-to-face method. The adoption of World Wide Web (Web) technology by the tertiary institutions has facilitated many of these changes, providing effective ways for widespread delivery and access of course information (Barnard 1997; Hansen, Deshpande & Murugasen 1999; McDonald & Postle 1999).

The use of the Web in tertiary institutions has seen many advantages to students. The Web enables the development of new and exciting integrated learning environments. Subjects may now be enhanced by the addition of Web-based resources that provide support for self-managed learning, and contain interactive elements that encourage student engagement in learning (Cornell 1999, Oliver). In many subjects, students are now typically provided with Web-based resources that they have the flexibility of accessing on or off campus, and at any time (Owston 1997; Ward & Newlands 1998). These electronic resources either replace, or are in addition to, the traditional paper resources. However, the time and effort required to provide Web resources are a cost to the staff involved in subject development and management (Bruce & Desloge 1999). The Web is a new and unfamiliar teaching environment for many tertiary lecturers. Web-based teaching resources are time consuming to design and develop, often requiring ongoing maintenance. Many resources need a knowledge of programming for their construction. Staff have had to acquire new skills to produce effective teaching resources on the Web, and make appropriate use of this new technology (Alexander 1995; Hansen et al. 1999).

Therefore, a question of interest is "What are the costs and benefits of the provision of Web-based teaching resources?", and related to this, "What motivates staff to use the Web in their teaching programs?". This paper reports on a quantitative and qualitative study that investigated the use of the Web in teaching within the Faculty of Information Technology (FIT) of Monash University. It presents staff perceptions of the time and

2

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effort required in development and maintenance of Web-based teaching resources and any perceived advantages, either pedagogical or for subject management. FIT, with over 200 academic staff, is the largest faculty of its kind in Australia. We have made the assumption that an IT faculty incorporating Web technology in its course curricula would show significant use of the Web in its teaching programs. This has provided an opportunity to study issues in the development of Web-based teaching resources with a group of teaching staff who have made a commitment to the use of Web technology in their teaching.

Survey of Teaching Staff

All subject lecturers in FIT were invited to participate in a survey that aimed to establish the extent to which the Web was being used in teaching within FIT, and their perceptions of its impact. Each lecturer was asked to complete one questionnaire for each subject they had responsibility for. This contained questions to determine what resources were provided for a subject and what percentage of each resource was provided in Web-based format. The survey also contained questions to establish the time taken to develop Web resources, the average time spent each week maintaining Web resources, and who (e.g. self, subject staff, external person or group) were responsible for these tasks. Provision was made on the questionnaires for staff to provide open-ended comments.

Over 180 surveys were distributed to subject lecturers and a total of 93 completed questionnaires were returned.

A corresponding survey was given to students in selected subjects in FIT in order to gauge how they valued the Web resources provided and how important they felt they were for their learning. The results of these surveys are reported in detail elsewhere (Sheard, Postema & Markham 1999).

Provision of the Web Teaching Environment

The survey showed that teaching staff in FIT are making extensive use of the Web in their teaching programs. Of the questionnaires returned, 86% of the subjects had a dedicated Web page. This finding is supported by an audit of subject Web pages during the same semester, which located Web pages for 80% of the subjects in the Faculty. Staff of the remaining 14% of subjects in the survey, which did not provide Web resources, indicated in their responses that this was a deliberate decision. The reasons they gave were that they did not wish to make resources freely available, the students did not have ready access to the Web, or it was not worth the effort as the subject was terminating.

In forty percent of the subjects, all resources were provided in Web format and in most subjects (82.5%) at least half of the resources were provide in Web format. Many of these resources were also provided on paper. For more than one third of the subjects in the survey, all the Web resources were new. The most common resources provided on the Web were the functional resources of lecture notes, subject updates, and subject information and these resources formed the basis of most of the Web sites.

Seventy percent of the subject Web pages were designed, developed, and maintained by the subject lecturer and for a further 20%, these responsibilities were shared by a small group of subject staff. They are consequently individual, reflecting the variety of teaching styles and content of subjects in the FIT. This is in line with the Monash University Education Policy which recognises that for effective teaching and learning "it is important for universities to maintain a sense of diversity (in education) ... allowing room for individual perspectives and randa & Pinto 1996).

Seventy seven percent of the Web pages were updated at least weekly with the most common practice being to update once a week. However, in the extreme cases, one lecturer updated subject Web resources daily and eight Web sites were not updated at all during semester.

There were large variations in the times spent on developing and maintaining subject Web resources. Cornell found similar variations in his study of university teaching staff in 1998 (Cornell 1999). A couple of lecturers indicated that they spent up to 200 hours before semester on initial development and another lecturer spent an average of 28 hours per week during semester maintaining subject Web resources. These were however

extraordinary cases and the average times were much lower. Over all the subjects in the survey, an average of 15 hours were spent at the beginning of semester setting up the Web page and resources. A further 2.0 hours per week were spent on maintaining existing resources or adding new resources during the semester. However for subjects which provided most resources on the Web an average of 20.6 hours were spent setting up the Web page and resources and an average of 3.7 hours per week were spent on maintenance and additions.

There are a number of factors that help explain the large variations in the initial development and ongoing maintenance times for Web resources.

- *Different management strategies for Web resources.* Some lecturers set up all or most of their Web resources before the beginning of semester, while others developed their Web sites as the semester progressed and therefore spent more time on ongoing development throughout the semester. This dynamic style of subject delivery has the advantage of flexibility and adaptability as discussed by Arnold (Arnold 1997). Ten percent of the subjects in the survey had Web pages that were never updated during the semester, but most (78.7%) were updated at least weekly.

- *The proportion of new Web resources.* The development and maintenance times increased as the proportion of new resources increased. Over 90% of the subjects in the survey had new Web resources and in 36.3% of subjects all the Web resources were new. Added to this the Web is a changing environment with new features and improvements to Web technology constantly being developed (Owston 1997).

- *The types of resources.* Web resources range from direct conversions of paper resources that take very little time to produce, to those that require many hours of work in design and development, e.g., animations. Web resources may be provided as static items that are never updated, e.g., a subject handbook, or a series of static items that are developed as the semester progresses, e.g., a set of lecture notes or tutorial exercises which are provided for classes each week. Alternately, Web resources may be dynamic items that are intended to be modified or developed over the semester e.g. subject updates. Some require regular updating such as feedback or newsgroups.

The Staff Voice

In the written responses on the open-ended section of the survey questionnaires, staff generally discussed their own use and management of the Web for their teaching. Their comments focussed on the types of Web resources they provided for their students and the time and effort that was involved, rather than presenting pedagogical perspectives of the use of the Web for their teaching. The issues involved in the technology implementation rather than the impact on students is a common theme in current literature, as noted by Windschitl (Windschitl 1998).

Many lecturers were very positive about the practical advantages of using the Web for their subjects. They saw the Web as an effective and efficient system for distributing course material and information to students.

> *"(The Web) saves an enormous amount of paper, saves time queueing at photocopying machines, improves "reach" to students, enables quick publication of "hot news" items or error corrections, stimulates email contact from students to tutors and myself..."*

By placing teaching resources on the Web, some lecturers are shifting the responsibility for obtaining these resources over to their students. This was highlighted as a saving in time because of the reduced amount of printing and photocopying needed. The amount of paper distributed to students is also reduced, although there is evidence from student surveys that resources provided electronically are often downloaded and printed by students anyway, producing no net saving in paper as found by Jones (Jones 1999).

The use of the Web as a distribution centre for course materials is not always popular with students. This agrees with the findings of an experiment by Ward & Newlands (Ward & Newlands 1998). There was evidence from the staff surveys that many lecturers, often in reaction to student requests, were providing students with paper copies of resources available on the Web.

> *"My lecture notes are all up on the Web   I give the students paper copies*
> *as well, they demand this!"*

Resources placed on the Web are instantly accessible by every student on or off campus. Many lecturers saw this as one of the main advantages of providing resources on the Web.   However intellectual property protection was an issue with a couple of lecturers who expressed concern about the security of the Web, and the fact that their Web resources were freely available to students in other courses and the outside world.

> *"I think it is a wonderful idea to have Web-based resources available to*
> *students.   But I would prefer to make the resources available only to*
> *students* enrolled *in the course"*

The Web has made possible the provision of new types of learning environments for students. Some lecturers appear to be using the Web to facilitate a move towards a distance education style of teaching as discussed by Miranda (Miranda & Pinto 1996).   One lecturer had actually moved all class-based tutorials for his subject into a forum on the Web.

> *"This semester I moved all formal tutorials onto the Web allowing*
> *occasional lecture times as needed. The response was great. Part timers*
> *and those with language problems fully participated in active debate. No*
> *more discussion-based format tutes for me!"*

Other lecturers took a negative view of this style of teaching, expressing their opinions that the Web should not be used as a substitute for face-to-face teaching.

> *"Having one integrated teaching environment is convenient for students*
> *however there is a danger that they may become reliant on this totally for*
> *their learning, not experiencing lectures and tutorial classes, contact with*
> *other students or exploring other sources of* information *such as libraries."*

The trend towards putting most subject resources on the Web was seen by some lecturers to be giving students unintended messages. A couple had experienced problems with students not attending lectures because they decided that all they needed was available to them on the Web.

> *"Drop in attendance at lectures since introduction of Web page...difficult*
> *to teach students who you do not see"*

The Web provides facilities for instant contact and communication with students however this often results in less personal contact.   Some lecturers expressed concern about the Web encouraging a remoteness from students and they were not able to easily monitor how their students were progressing through their subject. There are mechanisms to measure how often and how many accesses are made to Web pages however this does not provide the same quality of information as personal contact with students.

A typical subject Web page in this survey contained at least basic functional subject information, subject updates and lecture notes. The Web pages ranged from basic repositories of passive information, to totally integrated Web environments including interactive learning elements. Many lecturers commented about the amount of work required to produce and maintain Web resources, and especially the effort required to produce well designed and effective Web-based teaching resources, as also discussed in other studies (Gillani 1998; Ward & Newlands 1998). Typical comments were:

> *"Putting all the resources on the Web required a significant effort, which I*
> *think is usually underestimated..."*

> *"They take a huge amount of time to do properly"*

> *"No effort toward standardisation of subject Web pages is being made, 'n'*
> *subjects -> 'n' styles of Web pages"*

The lack of skill in working in a Web environment and not being able to produce good quality resources was a concern to some lecturers, as also found by Ward (Ward & Newlands 1998). There were a variety of tools used to produce Web resources, ranging from writing HTML using basic text editors through to WYSIWYG editors.

> *"...time constraints on exploiting the potential of the Web; lack of support*
> *for more ambitious use of the Web"*

> *"Difficult getting some resources into computer format..."*

5

One lecturer expressed disappointment about the variation in standard of subject Web resources in FIT:

> *"There is a very wide range of quality in respect of subject resources.*
> *Some of the Faculty's are innovative which reflects in a high standard of*
> *teaching materials being delivered over the Web. In other cases it is almost*
> *embarrassing to think that it appears under the Monash logo"*

The surveys revealed that some lecturers were providing Web resources for reasons other than subject management or pedagogical considerations. Some lecturers indicated that they felt obliged to provide resources on the Web because of pressure from students or other colleagues. With 86% of the subjects in FIT providing a Web page, there are indications that students now have an expectation that Web resources will be provided for them in each subject they study.

> *"Students are expecting to find information in all of the following ways with*
> *a high expectation of instant satisfaction of need, with constant pressure to*
> *provided up-to-date resources at all times for immediate student*
> *gratification; lectures, printed lecture notes, tutorial, printed tutorial notes,*
> *Web page, anonymous discussion, email, help desk. Time spent by staff on*
> *subject is extensive."*

There were few comments from lecturers about the benefits to students of providing Web resources, and these were expressed only in terms of convenience, availability, and accessibility of resources.

> *"From the informal feedback from students, it appears that students find it*
> *very useful to have a specific Web page for each subject which stores all*
> *relevant information and resources"*

> *"... very convenient for those students who do not come to the lectures, for*
> *announcements outside the lecture hours, and for correcting mistakes found*
> *in the course material and providing solutions to homework"*

> *"Extensive use made (by students) of on-line materials at numerous sites"*

The lecturers' responses to the open ended section of the survey showed their perspectives of the costs and benefits of the use of the Web in teaching. These comments focussed around issues of developing and managing the teaching environment. None of the lecturers who responded to the surveys mentioned the value of the Web for student learning. They remarked on the students' demand for Web resources and how much they were using them, but none indicated the possibility that this enthusiasm may then translate into a greater engagement in their learning.

Conclusion

The Web has transformed the tertiary teaching environment. This study of the use of the Web by lecturers within the Faculty of Information Technology indicated that there is a trend for most lecturers in the Faculty to provide a dedicated subject Web page for their students. The Web pages range from static pages with basic functional resources to totally integrated interactive learning environments. The production and maintenance of Web resources, with the necessary acquisition of the required skills, has significantly impacted on staff workloads. The survey revealed that many lecturers are spending considerable time each semester on the development and maintenance of Web resources for their students, often providing these resources in addition to the traditional paper resources. However, the survey also showed that most of the time was spent on the initial development of resources, and the ongoing maintenance times were considerably lower. It was a considerable saving in time to reuse Web resources.

The responses from the questionnaires indicated that many staff were enthusiastic about the advantages of using the Web in teaching. However most viewed the Web as an efficient and effective means of distributing resources to students rather than providing pedagogical benefits. A number of lecturers had developed or were in the process of developing engaging integrated Web-based teaching environments that were valued by their students, but to many others the Web was seen as a convenient facility to provide students with instant and

6

ready access to subject information. Some lecturers indicated that they were producing Web resources because of students' expectations rather than any perceived teaching or learning benefits.

Several lecturers expressed concerns about observed changes in student learning behaviour since the introduction of Web-based teaching resources in their subjects. An impressionistic view is that the provision of resources on the Web has encouraged students to disengage from face-to-face learning in subjects that were not designed or intended to be taught in that way.

The Web has changed the practices of tertiary educators. The Web enables the provision of new learning environments with a greater variety of teaching resources. The development and management of these resources is an added cost to the staff in time, effort, and acquisition of the variety of new skills necessary. With the widespread use of the Web in tertiary education, students now have an expectation that Web resources will be provided for them in every subject. This raises the issue of what the learning outcomes of the provision of these resources are. The question of the benefit for students considering the extra cost for staff remains unanswered. This is a critical issue for educators involved in the long-term design and management of Web based learning environments.

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7

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8